10/501735

DT15 Rec'd PCT/PTO 16 JUL 2004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of

Wayne Keith WEBB

Serial No.: To be assigned (National Phase of PCT/AU03/00086 filed January 28, 2003)

Filed: July 16, 2004

For: HANGAR BAR

CLAIM FOR PRIORITY

Mail Stop Patent Application
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The benefit of the filing date of the following prior foreign application filed in the following foreign country is hereby requested for the above-identified application and the priority provided in 35 USC 119 is hereby claimed:

Australian Appln. No. PS0159, Filed January 25, 2002.

The certified copy was submitted during the International Phase of prosecution.

It is requested that the file of this application be marked to indicate that the requirements of 35 USC 119 have been fulfilled and that the Patent and Trademark Office kindly acknowledge receipt of this document.

Respectfully submitted,

Date: July 16, 2004

By: Anthony P. Venturino

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APV/pgw
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PCT/AU03/00086 #2

AUSTRALIA

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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PS 0159 for a patent by MOUNT ISA MINES LIMITED as filed on 25 January 2002.

COMMONWEALTH OF AUSTRALIA
AUSTRALIA
PATENT OFFICE

WITNESS my hand this
Tenth day of February 2003

J. Billingsley

JULIE BILLINGSLEY
TEAM LEADER EXAMINATION
SUPPORT AND SALES

PRIORITY DOCUMENT
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AUSTRALIA

PATENTS ACT 1990

PROVISIONAL SPECIFICATION

FOR THE INVENTION ENTITLED:-

"HANGER BAR"

The invention is described in the following statement:-

Technical Field

The present invention relates to cathodes used in electrolytic recovery of metals.

Background Art

Any discussion of the prior art throughout the specification should in no way be considered as an admission that such prior art is widely known or forms part of common general knowledge in the field.

There are various processes and apparatus for electro-refining or electro-winning of metal. One particularly successful process for electro-depositing of copper, for example, is the so called ISA PROCESS. In this process, stainless steel cathode mother plates are immersed in an electrolyte bath with copper anodes. The copper from the anodes dissolve into the electrolyte and are subsequently deposited in a refined form on the cathode. The electrolytically deposited copper is then stripped from the cathode by first flexing the cathode to cause at least part of the copper deposit to separate from the cathode, and then wedge stripping or gas blasting the remainder of the copper from the cathode.

The cathode generally consists of a stainless steel sheet, and a hanger bar connected to the top edge of the cathode sheet to hold and support the cathode in the electrolytic bath.

There are a wide variety of hanger bar constructions. Early cathode plates used had solid copper hanger bars which provided not only excellent electrical conductivity but adequate strength to support both the cathode plate and the metal deposited thereon. It was discovered, however, that under repeated use both in the electrolytic bath and in the stripping machinery the relatively ductile copper bar tended to bend or be damaged.

In addition, connection of the stainless steel cathode plate to the copper hanger bar was sometimes difficult. To overcome this difficulty, complex construction and welding techniques were required. In one instance, as discussed in US Patent No 5492609, additional parallel grooves were machined in the hanger bar on either side of the central groove which accepts the cathode sheet. The cathode sheet and the hanger bar were then welded together along this inset groove, the ridges formed between the parallel grooves and the sheet then being used as welding material. This process sometimes required the copper hanger bar and steel cathode sheet to be welded in a thermally conductive liquid to maintain the bar at a constant uniform temperature.

The cost, complexity and durability of the copper hanger bar led the industry to use iron or steel hanger bars for greater structural strength. In most cases, while structural integrity was good, the iron or stainless steel was a poor conductor of electricity. Accordingly, a coating of electrically conductive metal was electrolytically deposited on the hanger bar. Such iron or steel hanger bars with electrolytically deposited conductive metal, came in various shapes such as simple solid beams, I-beams or hollow sections.

Once again, however, it was found that these new configurations had their own difficulties. Firstly, such a coating technique only permits tolerances within the technical limitation of the electroplating process. The thickness and adhesion of the metal coating is additionally limited by the electrocoating process.

It is an object of the present invention to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.

Disclosure of the Invention

In a broad aspect, the present invention provides a hanger bar for a cathode plate used in electrolytic recovery of metal comprising a stainless steel support element, at least a portion of said support having an electrically conductive metal affixed thereto.

Preferably, the stainless steel support is a bar and is hollow.

The electrically conductive metal may be affixed to and cover a portion or the entire exterior of the stainless steel support. This is accomplished by any suitable technique eg an interference fit, welding, mechanical fixing with or without fasteners, etc. In one embodiment, the stainless steel support and conductive metal may be co-extruded.

The use of stainless steel as the support element imparts strength, long term durability and corrosion resistance for the hanger bar. These features are clearly important in obtaining an extended operational life for the hanger bar. However, as is well known in the art, stainless steel is, in itself a relatively poor electrical conductor. The introduction of an electrically conductive metal coating or cladding will permit the ready transfer of electrical current along the hanger bar into the blade of the cathode plate.

However, unlike the prior art this electrical conductivity is achieved by affixing a sleeve of electrically conductive material. This mechanically fitted sleeve permits a more precise engineering specification to be applied to the cladding thickness and the

ability of the cathode to maintain a vertical alignment in the electrolytic cells. As discussed above, tolerances now required for operation of electrolytic cells at high current density cannot be easily achieved by other conventional mechanisms such as electroplating of the stainless steel hanger bar.

In addition, the necessary strength for the hanger bar cannot be obtained from the use of copper alloy within the hanger bar construction.

In a preferred embodiment, the electrically conductive sleeve surrounds the exposed portions of the hanger bar, and extends part way down the blade or plate of the cathode. This embodiment reduces the electrically resistance to current passing through the bar onto the plate and in addition reduces the possibility of bi-metallic corrosion of the joint between the electrically conductive metal and the cathode plate which is normally made from stainless steel.

In addition to the aforementioned advantages arising from use of the hanger bar, the production of the hanger bar itself is much simpler that conventional mechanisms. For instance, it is not necessary to use a portion of the hanger bar as weld material. Nor is it necessary to electroplate the stainless steel hanger bar. As will be known to persons skilled in the art, in one conventional technique, for production of the cathode plate, after the stainless steel hanger bar is welded to the stainless steel cathode plate, the entire assembly must be inverted and dipped into an electrolytic bath a sufficient depth to electroplate the hanger bar with the conductive metal. The cost and handling difficulties associated with this mechanism are clear. Mechanically affixing the electrically conductive metal to the stainless steel bar or tube is much simpler and more cost effective than current techniques.

In a second embodiment, the present invention provides a method of producing a cathode plate for electrolytic recovery of metal comprising providing a stainless steel hanger bar, connecting said hanger bar to a cathode plate and subsequently affixing to said hanger bar a cladding of electrically conductive metal.

Unless the context clearly requires otherwise, throughout the description and the claims, the words 'comprise', 'comprising', and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

Brief Description of the Drawings

The present invention will now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 is a front elevational view of a cathode plate incorporating the hanger bar with the present invention,

Figure 2 is a sectional view through section A-A of Figure 1 showing the hanger bar and cathode plate according to a first embodiment of the present invention, and

Figure 3 is a cross sectional view showing the hanger bar and cathode plate according to a second embodiment of the present invention.

Best Mode for Carrying Out the Invention

As shown in Figure 1, a cathode 1 comprises a hanger bar 10 and a cathode plate 20.

As mentioned above, when electro-refining copper according to the ISA PROCESS, the cathode plate 10 is a stainless steel blade. However, it will be appreciated that the cathode plate can be manufactured from any suitable material. Titanium and other metals may be used in electro-refining operations.

As shown more clearly in Figure 2, the hanger bar 10 comprises a stainless steel bar 22. In the embodiment shown, the stainless steel bar is hollow but is preferably sealed at the ends. It is not essential that the stainless steel bar 22 be hollow.

A sleeve of electrically conductive material 24, eg copper, is affixed around the stainless steel bar, this sleeve acts to conduct electricity from the electrical connections in the electrolytic bath through the hanger bar to the cathode plate.

Welds 26 run along the terminating edge of copper sleeve 24 connecting the copper sleeve to the plate/bar assembly.

As shown in Figure 3, the sleeve may include an extension 28 onto the copper plate 10. The intention of this extension is to reduce electrical resistance between the hanger bar and the copper plate, and reduce bi-metallic corrosion between the hanger bar and the plate.

The applicants have surprisingly found that mechanically affixing a sleeve of electrically conductive material to a stainless steel hanger bar has significant advantages over conventional systems.

The mechanical coating or cladding of the stainless steel bar provides for closer tolerances and a more precise engineering of the cladding thickness. This is important to

maintain vertical alignment of the cathode plate in the electrolytic cell when resting on the electrical connectors either side of the electrolytic bar.

No current process allows such fine tolerances to be applied to the hanger bar construction and as far as the applicant can ascertain this mechanical affixing of the electrically conductive sleeve over the stainless steel hanger bar has not been proposed to date.

In addition, having a stainless steel core, the bar will retain long term mechanical strength with ease of manufacture. It will also be appreciated that this construction has advantages in terms of maintenance. For instance, if the sleeve/cladding of conducting material is damaged, it is a simple matter to remove the cladding and replace. This can also be applied to current hanger bars with electrolytic coatings of conductive material. If these coatings are damaged or it is found that the cathode plate is not performing adequately in the cell due to poor alignment, the present invention allows precise tolerances to be applied to the hanger bar not only to repair the hanger bar but provide a more precise engineering of the cladding thickness and hence alignment of the cathode plate in the bar.

The hanger bar and method of production may be embodied in other forms without departing from the spirit or scope of the present invention.

DATED this 25th Day of January 2002

MOUNT ISA MINES LIMITED

Attorney: PAUL G. HARRISON
Fellow Institute of Patent and Trade Mark Attorneys of Australia
of BALDWIN SHELSTON WATERS

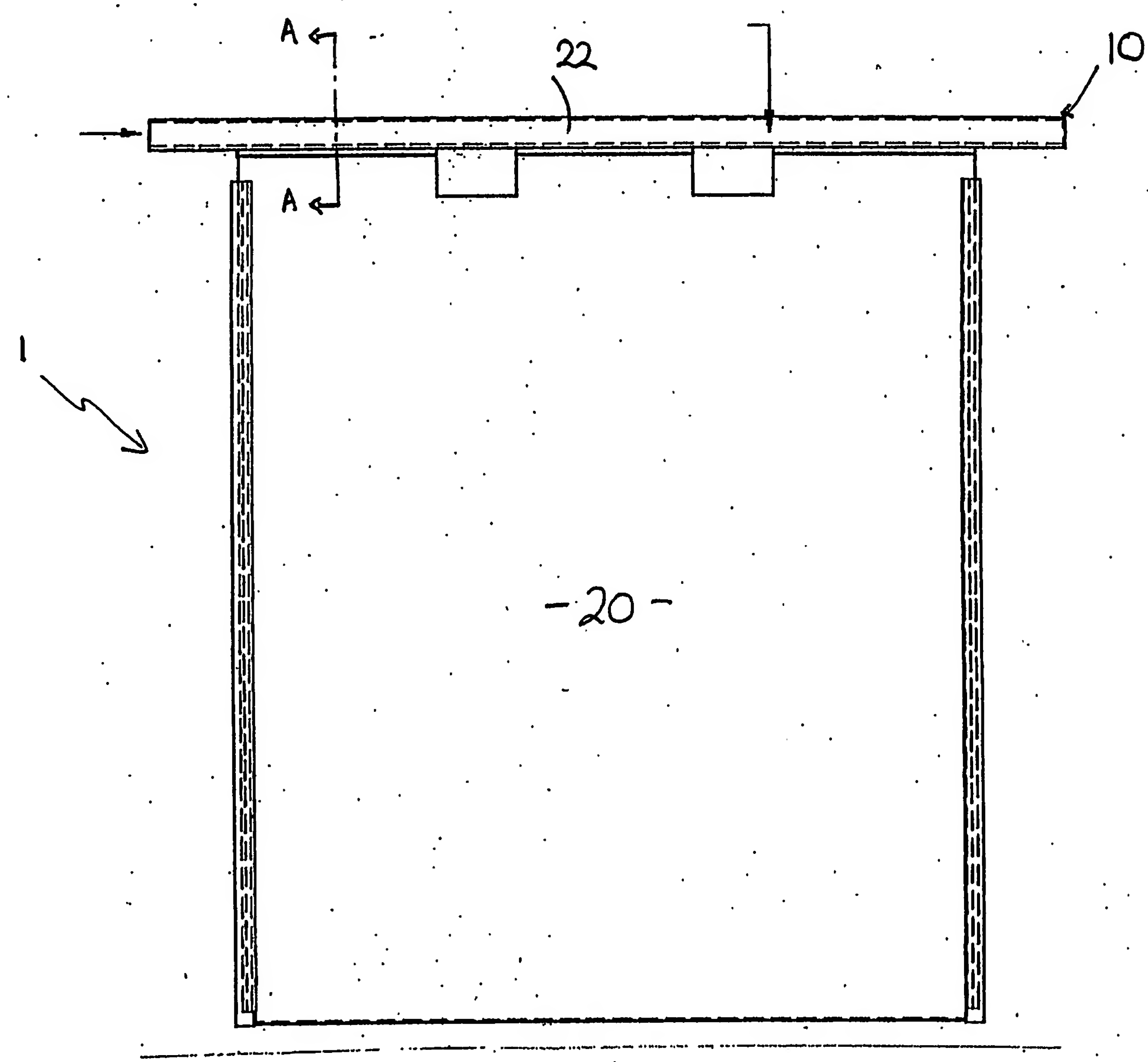

Fig 1

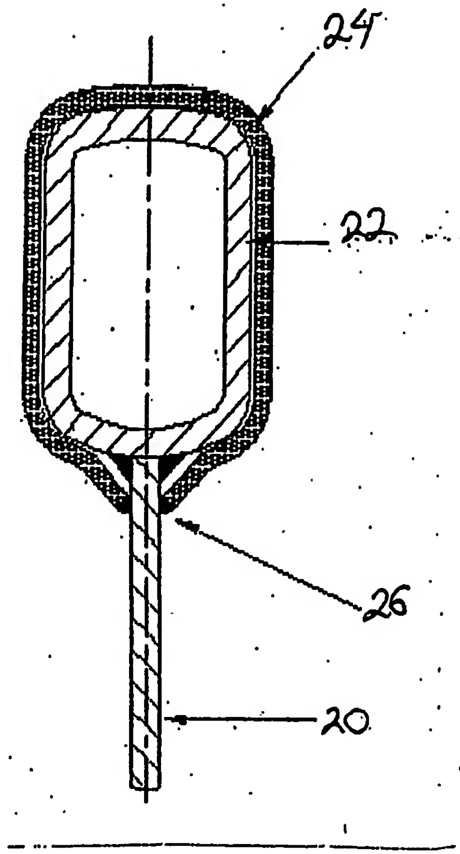

Fig 2

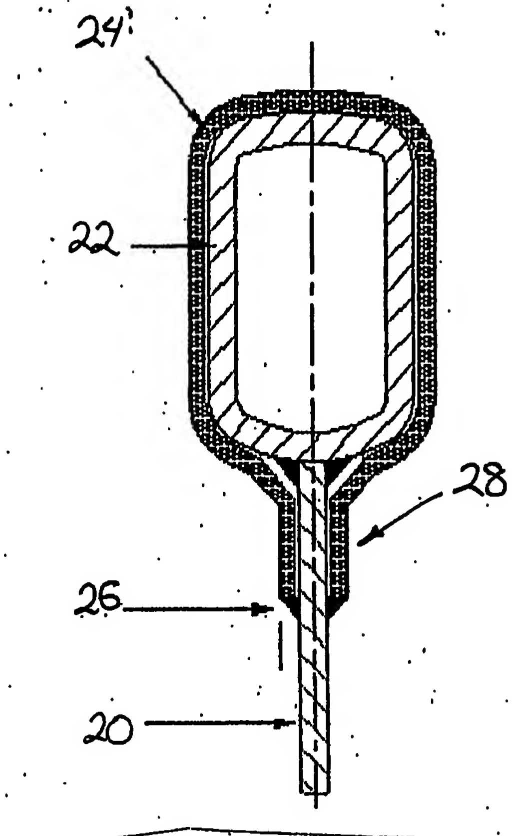

Fig 3